

Contents

Acknowledgments	xxiii
Introduction	xxv
<hr/>	
Part I: Introducing Assembly Basics	1
<hr/>	
Chapter 1: Understanding Assemblies.....	3
Understanding the Purpose of Assemblies.....	4
Identifying types of assemblies	5
Driving an assembly with base part and mates	5
Driving an assembly with sketches and planes	7
Modeling parts in place.....	8
Modeling parts as multi-bodies.....	10
Inserting a master model.....	11
Excluding some parts	12
Creating an alternative to multiple assemblies.....	12
Creating Assembly Templates.....	13
Putting Parts into Assemblies.....	15
Understanding External References.....	16
Referencing external files in-context.....	17
Referencing external files from a part.....	18
Summary.....	19
Chapter 2: Navigating the Assembly Interface	21
Identifying Elements of the SolidWorks Assembly Interface	22
Using the CommandManager and toolbars.....	23
Introducing the assembly tools	24
Using the Heads-Up View toolbar.....	25
Using the Shortcut "S" toolbar.....	26
Working in the assembly FeatureManager	27
Working with multiple document windows	29
Managing open windows.....	29
Understanding the Interface for Moving and Mating.....	31
Using the Move Component interface.....	32
Free Drag.....	33
Along Assembly XYZ.....	33

Contents

Along Entity	34
By Delta XYZ	34
To XYZ Position	35
>Selecting Move Component options.....	35
Dynamic Clearance	36
Using the Mate interface.....	36
Considering workflow.....	36
Looking at the rest of the Mate interface	38
Summary.....	40
Chapter 3: Visualizing Assemblies	41
Manipulating the View.....	41
Using arrow keys	42
Using the middle mouse button	42
Clicking the triad.....	42
Using mouse gestures	43
Using the Magnifying Glass.....	44
Investing in a 3D mouse device.....	45
Controlling Appearances	45
Removing appearances and overrides	47
Using the Display Pane	48
Using the DisplayManager	50
Controlling Appearances with the DisplayManager	51
Applying decals	52
Controlling Scene, Lights, and Cameras.....	56
Creating a walk-through.....	56
Using Display States.....	59
Using Edge and Wireframe Settings	61
Making the case for shaded with edge display	61
Using tangent edge display.....	63
Using Assembly Visualization.....	64
Tutorial: Using Assembly Visualization	65
Summary.....	66
Part II: Working with Assemblies	67
Chapter 4: Building Efficient Assemblies	69
Identifying the Elements of an Assembly	69
Understanding standard reference geometry items	70
Working with assembly equations.....	71
Solving external references	72
Understanding link values and global variables.....	72
Renaming.....	72
Recommendations	73
Using an assembly layout sketch	73

Working with virtual components	75
Creating assembly reference geometry	75
Comparing history-based and non-history-based portions of the assembly tree	75
Understanding parts and subassemblies	76
Creating folders	77
Organizing mates	77
Applying assembly features	77
Using component patterns and mirror components.....	78
Looking at in-context reference Update Holders.....	78
Using Smart Fasteners.....	79
Applying the Hole Series	79
Using SpeedPaks.....	80
Using ghosts	80
Sharing self-contained data.....	80
Using SpeedPaks with drawings	80
Using Subassemblies	82
Creating subassemblies from existing parts.....	82
Inserting a new subassembly.....	83
Dissolving subassemblies	83
Organizing for performance.....	84
Solving mates	84
Using flexible subassemblies.....	84
Working with legacy data.....	84
Organizing for the Bill of Materials.....	85
Grouping subassemblies by relative motion	86
Organizing groups of purchased components	87
Depicting an assembly process.....	87
Influencing item numbering.....	87
Separating steps.....	87
Patterning considerations.....	88
Using Folders	88
Creating folders in the FeatureManager.....	89
Using Add To New Folder	89
Using Create New Folder.....	89
Adding items to existing folders.....	89
Reordering items in the tree.....	90
Working with Tree Display Options	91
Showing feature names and descriptions.....	91
Showing component and config names and descriptions.....	92
Using names other than the part filename in the assembly FeatureManager	92
Using Component Reference per Instance.....	93
Viewing features, mates, and dependencies	94
Working with Assembly Tools	95
Using Sensors	96
Using the AssemblyXpert	96

Contents

Tutorial: Arranging Assemblies.....	97
Tutorial: Managing the FeatureManager.....	101
Summary.....	102
Chapter 5: Getting More from Mates.	103
Applying Mates	104
Mating through the Mate PropertyManager.....	104
Understanding the mate workflow.....	105
Changing the view and model position.....	105
Applying the Select Other command	106
Using Multiple Mate mode.....	107
Taking advantage of SmartMates	107
Alt+dragging a SmartMate.....	107
Dragging between windows	110
Using Mate references.....	110
Mating with macros	110
Mating for Motion	111
Analyzing degree of freedom.....	111
Setting up successful motion	113
Working with Advanced and Mechanical Mate Types.....	114
Symmetric mate	115
Cam mate.....	116
Width mate.....	117
Gear mate	118
Rack and Pinion mate	119
Limit mates.....	120
Screw mate	120
Path mate	121
Linear Coupler mate.....	123
Hinge mate.....	123
Belt/Chain.....	124
Editing and Troubleshooting.....	124
Editing existing mates	125
Troubleshooting assembly mates.....	126
Troubleshooting warnings and errors	127
Examining Mate Options.....	128
Reviewing Mate Best Practices	129
Tutorial: Mating for Success.....	130
Summary.....	135
Chapter 6: Working with Assembly Sketches and Layouts.	137
Looking at the Techniques.....	138
Using the assembly layout sketch.....	138
Using master model.....	143

Using the Layout Feature.....	144
Using the Layout workflow	145
Working with virtual components.....	147
Balancing advantages and limitations.....	147
Tutorial: Working with a Layout.....	148
Summary.....	154
Chapter 7: Using Assembly Tools	155
Placing Parts without Mates.....	155
Using the Move Component options	156
Using Free Drag.....	157
Moving with Along Assembly XYZ	158
Moving with Along Entity	158
Using By Delta XYZ.....	158
Using To XYZ Position	159
Using the For Positioning Only option	160
Building parts in place.....	161
Using Proximity Tools.....	162
Using Interference Detection.....	162
Displaying the results	163
Ignoring interferences.....	163
Using Component view	164
Selecting options.....	164
Displaying options for non-interfering components	164
Working with Clearance Verification.....	164
Using Dynamic Clearance.....	166
Working with Collision Detection	167
Using Physical Dynamics.....	168
Using Sensors	168
Selecting Components.....	170
Selecting with a volume	171
Selecting suppressed components.....	172
Choosing hidden components	172
Selecting parts mated to another part.....	172
Selecting internal components	172
Choosing Toolbox parts	172
Using the Advanced Select options	172
Reading AssemblyXpert Results.....	173
Using Defeature	175
Using the Hole Alignment Tool	176
Working with Large Assemblies.....	177
Using special techniques to improve large assembly performance	178
Working locally	178
Organizing data into subassemblies	178
Avoiding in-context references	178

Contents

Avoid fancy display settings	179
Repairing errors.....	179
Avoiding unnecessarily complex geometry.....	179
Using special tools to improve large assembly performance.....	179
Using simplified configurations	179
Using SpeedPak.....	180
Using Display States instead of configurations	180
Using Lightweight options.....	180
Using Large Assembly Mode.....	180
Using detached drawings.....	180
Suspending automatic rebuilds.....	180
Summary.....	181
Chapter 8: Controlling Assembly Configurations and Display States . . . 183	
Using Display States.....	183
Controlling display states and configurations	184
Using display states with drawings	186
Using part display states in parts	187
Understanding Assembly Configurations.....	187
Applying configurations for performance	187
Suppressing components and features.....	187
Configuring SpeedPaks	188
Using part configurations for speed.....	188
Getting familiar with the Advanced Component Selection	190
Taking a look at the Isolate function.....	191
Finding features with the Simplify Assembly tool	191
Controlling display performance.....	192
Using configurations for positions.....	194
Positioning with mates	194
Positioning with sketches.....	195
Applying configurations for product variations.....	197
Using design tables for assembly configurations	197
Working with Modify Configurations and the Configuration Publisher.....	198
Looking at assembly configuration dos and don'ts.....	199
Tutorial: Working with Assembly Configurations.....	199
Summary.....	204
Chapter 9: Patterning and Mirroring Components 205	
Using Local Component Patterns.....	206
Creating local pattern references	206
Patterning the seed only	207
Using the Instances to Skip option.....	209
Using Mirror Components	210
Setting the orientation	210
Creating opposite-hand versions	210
Completing the task.....	212

Using Feature-Driven Component Patterns	213
Understanding Other Pattern Options.....	214
Tutorial: Creating Component Patterns.....	216
Summary.....	218
Chapter 10: Modeling in Context	219
Understanding In-Context Modeling	219
Working through a simple in-context example	220
Starting a new assembly.....	220
Inserting a new part.....	221
Introducing virtual components.....	222
Creating the part geometry.....	222
Saving a virtual component	222
Creating an in-context part	223
Editing the driving part of an in-context reference.....	226
Weighing the advantages of in-context modeling	228
Anticipating problems with in-context modeling.....	228
Identifying alternatives to in-context modeling.....	229
Using Assembly layout modeling	229
Using Multi-body modeling.....	230
Dealing with the Practical Details of In-Context Modeling	230
Understanding the in-context process	230
Starting out in-context	230
Working in-context	232
Looking at in-context best practices	239
Working with multiple contexts	240
Using in-context with configurations	243
Using in-context with motion.....	243
Working with in-context with multiple instances	245
Using in-context and file management	245
Using in-context and mates.....	245
Working with circular references	245
Using skeletons and layouts	246
Using in-context in libraries	247
Removing relations.....	247
Deciding whether to use mating or in-context.....	248
Communicating design intent.....	248
Using Other Types of External References	248
Using inserted parts	248
Working with split parts.....	249
Using mirror parts.....	249
Using the Layout Feature.....	249
Using the Layout workflow	250
Understanding virtual components.....	252
Balancing advantages and limitations.....	252

Contents

Tutorial: Working In-Context	253
Summary.....	259
Chapter 11: Creating Assembly Features	261
Creating Assembly Cuts.....	262
Using the Feature Scope	264
Propagating features to parts.....	264
Making Fillets and Chamfers in Assemblies.....	266
Creating Weld Beads.....	267
Working with Envelopes.....	270
Summary.....	272
Chapter 12: Using Parametric Links in Assemblies	273
Using Equations in an Assembly	273
Tracking external references.....	274
Renaming documents referenced by equations.....	274
Sharing equations.....	275
Driving equations between parts	276
Following best practices.....	277
Using Link Values and Global Variables in Assemblies	277
Working with Derived Sketches in Assemblies	277
Using Inserted Parts to Communicate Parametric Control	278
Summary.....	280
Chapter 13: Editing, Evaluating, and Troubleshooting Assemblies	281
Working with Mates.....	281
Listing mates in the Mates folder.....	282
Listing mates under the component.....	283
Replacing features with mates.....	284
Working with the View Mates tool.....	285
Using the View Mate Errors window	287
Using the MateXpert.....	287
Editing mates.....	289
Editing File Management Issues.....	292
Using Save options and Pack and Go.....	292
Replacing components	294
Forming and dissolving subassemblies	296
Moving parts in and out of subassemblies	296
Moving mates from an assembly to a subassembly	297
Evaluating Assemblies.....	298
Using the AssemblyXpert	298
Identifying FeatureManager symbols.....	300
Using the Isolate function	300
Using Reload	301
Summary.....	302

Part III: Creating and Using Libraries	303
<hr/>	
Chapter 14: Using Toolbox	305
Understanding Toolbox.....	305
Comparing configurators and libraries.....	306
Taking a look at how Toolbox works.....	307
Looking at the database.....	307
Taking precautions when installing configurations.....	308
Organizing the Toolbox parts.....	311
Choosing configurations or parts.....	312
Deciding which option is better.....	313
Using Toolbox.....	314
Turning on Toolbox and the Toolbox Browser	315
Populating holes	315
Exploring Smart Fasteners.....	318
Organizing Toolbox parts in an assembly.....	319
Working recommendations	320
Working with the simplest setup that works.....	320
Using a complete setup that works	321
Considering the most popular arrangement.....	321
Using the Hole Wizard	322
Exploring the Hole Series interface	323
Looking at Hole Series quirks.....	326
Tutorial: Gaining Experience with the Hole Wizard and Toolbox.....	327
Summary.....	335
Chapter 15: Working with Libraries	337
<hr/>	
Setting Up a Library	338
Building the Design Library	339
Adding to the library.....	340
Adding a file location	341
Creating a new folder	343
Using the Design Library	343
Adding Mate References to library parts	343
Placing parts with Mate References into assemblies.....	345
Exploring Other Design Library Functions.....	347
Using Annotations in the library.....	347
Using sheet metal-forming tools in the library	348
Using assemblies in the library.....	348
Routing.....	348
Understanding Smart Components.....	349
Using Smart Components	349
Getting started with a simple Smart Component.....	350
Auto-sizing Smart Components.....	353

Contents

Making Smart Components	355
Getting started with a simple Smart Component.....	355
Creating an auto-sizing Smart Component.....	358
Managing files with Smart Components.....	363
Editing Smart Components.....	364
Tutorial: Working with Smart Components.....	365
Summary.....	368
Part IV: Creating Assembly Drawings	369
Chapter 16: Creating Assembly Drawings	371
Combining Parts and Assemblies on the Same Drawing.....	371
Dimensioning assembly features.....	372
Assigning the document driving the custom properties	372
Using Multi-Page Templates	373
Using Views with Special Assembly Functions	375
Using the Alternate Position View.....	375
Creating views of an exploded assembly.....	376
Adding explode lines.....	380
Showing exploded view.....	381
Creating section views.....	382
Excluding parts from section views	382
Aligning the view.....	382
Adjusting the hatching	383
Broken-Out Section View	384
Drawing the closed loop.....	385
Selecting the depth	385
Editing the view	386
Using Color in Assembly Drawing Views.....	387
Setting Up Drawings of Large Assemblies.....	388
Using detached drawings	388
Working with lightweight drawings	390
Using SpeedPak with drawings	390
Using draft quality views.....	391
Tutorial: Creating a Simple Assembly Drawing.....	392
Summary.....	394
Chapter 17: Working with Tables and Drawings	395
Driving the Bill of Materials.....	395
Examining the SolidWorks table-based BOM.....	396
Creating table-based BOM templates	397
Setting a table anchor	398
Using BOM types.....	399

Using configurations	399
Locating the Keep Missing Items option	399
Choosing Zero Quantity Display options	400
Assigning item numbers	400
Displaying the BOM contents	401
Controlling the appearance of the table-based BOM	401
Dissolving, combining, numbering, and restructuring for indented BOMS	402
Adding columns or rows	403
Editing BOMs	404
Retiring the Excel-based BOM	405
Using Design Tables	406
Placing Hole Tables on Drawings	408
Using Revision Tables	410
Using General Tables	413
Working with Tables in Models	413
Tutorial: Using BOMs	414
Tutorial: Using Hole Tables	418
Tutorial: Using Revision Tables	420
Summary	421

Part V: Using Specialized or Advanced Techniques 423

Chapter 18: Using DriveWorks Xpress	425
Introducing DriveWorks Xpress	426
Exploring DriveWorks Xpress for your products	427
Aligning expectations with some estimates	428
Building the Original Model	429
Automating an Example	430
Getting Started: Automating a Design	431
Activating DriveWorks Xpress	431
Creating a database	432
Capturing models	433
Adding features and dimensions	434
Creating fields for the form	436
Building rules	436
Building a rule to suppress a component pattern	438
Building a rule to change filenames	438
Using custom properties with DWX rules	438
Building a rule for custom properties	440
Running the example job	440
Working with drawings	443
Summary	443

Contents

Chapter 19: Employing Master Model Techniques	445
Using Pull Functions	447
Understanding the Insert Part feature	447
Understanding the Insert Into New Part feature.....	451
Using Push Functions.....	452
Working with the Split feature	452
Splitting a body.....	452
Assigning names automatically.....	453
Creating an assembly.....	454
Working with the Save Bodies feature	454
Tutorial: Working with Master Model Techniques.....	455
Summary.....	459
Chapter 20: Using Weldments	461
Sketching in 3D	462
Navigating in space	462
Understanding sketch relations in 3D sketches.....	463
Creating planes in space	465
Limiting path segments.....	466
Using dimensions in 3D sketches	467
Using the Weldment Tools.....	467
Using the Weldment feature	467
Introducing the Structural Member feature	468
Grouping selected path segments	470
Locating and orienting the profile	471
Using disjoint sketch segments	472
Using custom profiles	472
Adding corner treatments	473
Using arc segments.....	474
Patterning bodies and sketching with symmetry	475
Creating configurations	475
Using the Trim/Extend feature	475
Using the End Cap feature.....	477
Working with the Gusset feature	477
Using Non-Structural Components	478
Using Sub-Weldments.....	479
Working with Cut Lists	479
Using Cut-List Properties	480
Excluding and reordering cut list items.....	482
Using weld beads and fillet beads in weldments and assemblies	482
Creating Weldment Drawings	485
Tutorial: Working with Weldments	487
Summary.....	495

Chapter 21: Using Mold Tools	497
Working with the Mold Tools Process.....	498
Preparing the plastic part for Mold Tools.....	500
Shelling the part and applying draft.....	501
Adding the plastic part to a blank part	501
Using the Scale feature.....	501
Inserting Mold folders	502
Parting lines	503
Initiating the shut-off surfaces.....	506
Parting surface.....	508
Working example	509
Using the manual options	509
Repairing the manual mode parting surface.....	512
Tooling split	514
Using the Core feature	515
Intervening Manually with Mold Tools	516
Passing shut-offs	516
Creating non-planar parting surfaces.....	517
Summary.....	519
Chapter 22: Working with Large Scale Design	521
Creating a Walk-Through	522
Creating a GridSystem	524
Starting the GridSystem feature.....	525
Creating the sketch	526
Using the GridSystem PropertyManager.....	526
Understanding the GridSystem output	527
Viewing the Grid Components	528
Transferring Data with the IFC File Type.....	529
Summary.....	530
Chapter 23: Animating with the MotionManager.	531
Familiarizing Yourself with the MotionManager	532
Understanding the terminology.....	532
Driving an animation	533
Planning an animation.....	534
Identifying elements of the MotionManager	535
Using display options.....	536
Using the MotionManager interface	536
Formatting output.....	536
Using the Animation Wizard.....	537
Creating a rotating animation	537
Creating an exploded view animation.....	540

Contents

Animating an assembly	540
Creating an explode.....	541
Putting the rotate into an animation timeline	543
Adding the explode to the animation	544
Making a part look flexible.....	544
Collapsing the exploded assembly.....	545
Animating a zoom	545
Animating a changing mate.....	546
Animating the View.....	547
Driving the view with key points.....	548
Using the Orientation and Camera Views feature.....	548
Disabling playback of view keys	549
Introducing the timebar	549
Creating key points.....	550
Zooming and free view manipulation.....	550
Using Interpolation modes.....	551
Correcting mistakes	552
Using paths to control cameras	552
Recalling the Walk-through feature.....	552
Rotating the model using a path	553
Going beyond 100 percent or 360 degrees.....	555
Animating with Key Points	556
Getting started	556
Using the timebar with key points	558
Copying and mirroring motion.....	559
Adjusting the speed of actions	559
Outputting the animation.....	560
Looking at other options.....	561
Running test animations	561
Selecting a compressor	562
Animating with Basic Motion.....	562
Using gravity and contact.....	562
Using motors and springs	563
Animating a chain and a spring using motors.....	564
Summary.....	566
Part VI: Appendixes	567
Appendix A: Finding Help	569
SolidWorks Help.....	569
SolidWorks Web Help.....	570
Contents.....	570
Index.....	570
Search	570

Contents

SolidWorks Website.....	571
Graphics Cards Links.....	571
Customer Portal.....	572
SolidWorks Forums	572
Knowledge Base	572
Software downloads.....	572
Release Notes	573
What's New	573
Installation and administration guides.....	573
PDMWorks Workgroup Vault Debug Guide.....	573
FLEXlm End Users Guide.....	573
User Groups.....	574
Online Forums.....	574
Blogs	574
Forums	575
Non-Commercial Websites	575
Appendix B: What's on the DVD	577
System Requirements	578
Using the DVD with Microsoft Windows	578
Windows versions	579
SolidWorks versions.....	579
What's on the DVD.....	580
Using the author files folder.....	580
Using the video tutorials folder.....	580
Using the TechSmith Screen Capture Codec	580
Accessing additional author videos.....	580
Troubleshooting	580
Customer Care	581
Index	583

